NON-PUBLIC?: N
ACCESSION #: 8901310030
LICENSEE EVENT REPORT (LER)

FACILITY NAME: PLANT HATCH, UNIT 2 PAGE: 1 OF 6

DOCKET NUMBER: 05000366

TITLE: COMPONENT FAILURE CAUSES BOTH RECIRC PUMPS TO TRIP REQUIRING SCRAM
EVENT DATE: 12/25/88 LER #: 88-024-00 REPORT DATE: 01/24/89

OPERATING MODE: 1 POWER LEVEL: 090

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION
50.73(a)(2)(i), 50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Steven B. Tipps, Manager Nuclear Safety and Compliance, Hatch

TELEPHONE: (912) 367-7851

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: JJ COMPONENT: 33 MANUFACTURER: N015
REPORTABLE TO NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO EXPECTED SUBMISSION DATE:

ABSTRACT:

On 12/25/88, at approximately 0510 CST, Unit 2 was in the run mode at an approximate power level of 2202 MWT (approximately 90% of rated thermal power). At that time, both Reactor Recirculation Pumps tripped while performing the weekly surveillance on Turbine Stop Valves (TSVs). The unit was manually scrammed immediately as required by Unit 2 Technical Specification Section 3.4.1.1, Action a. Following the manual scram, reactor vessel water level decreased to the Primary Containment Isolation System valve Group 2 isolation setpoint and all Group 2 valves isolated as designed.

The root cause of this event is component failure. The roll pin in the actuating arm of the limit switch for TSV Number 4 was broken. This prevented the TSV from picking up the actuating arm when the valve was open fully. As a result, the Recirculation Pump Trip logic sensed TSV Number 4 less than 90% open. When TSV Number 2 was closed for testing, the logic was satisfied and both Recirculation Pumps tripped per design.

The corrective actions for this event included repairing the failed limit switch and revising TSV and Turbine Control Valve testing procedures.

END OF ABSTRACT

Plant and System Identification

General Electric - Boiling Water Reactor Energy Industry Identification System codes are identified in the text as (EIIS Code XX).

Summary of Event

On 12/25/88, at approximately 0510 CST, Unit 2 was in the run mode at an approximate power level of 2202 MWT (approximately 90% of rated thermal power). At that time, both Reactor Recirculation Pumps (EIIS Code AD) tripped while performing the weekly surveillance on Turbine Stop Valve (TSV EIIS Code JJ) Number 2. The unit was manually scrammed immediately following the trip of both Recirculation Pumps as required by Unit 2 Technical Specification Section 3.4.1.1, Action a. Following the manual scram, reactor vessel water level decreased to the Primary Containment Isolation System (PCIS EIIS Code BD) valve Group 2 isolation setpoint and all Group 2 valves isolated as designed. The cause of the event was a broken limit switch on TSV Number 4. This bad limit switch, in conjunction with testing of TSV Number 2, resulted in actuation of the Recirculation Pump Trip (RPT) logic and the trip of both Recirculation Pumps. The bad limit switch was repaired and satisfactorily functionally tested, and the reactor was returned to power operation on 12/26/88.

Description of Event

On 12/25/88, at approximately 0506 CST, Unit 2 was in the run mode at an approximate power level of 2202 CMWT (approximately 90% of rated thermal power). Power level had been reduced from approximately 2431 CMWT (approximately 100% of rated thermal power) in order to perform TSV testing. The load reduction, which is required by plant procedure 34SV-N30-001-2S, "Main Turbine Weekly Surveillance Test," began at approximately 0444 CST and was completed at approximately 0506 CST. When the load reduction was completed, TSV testing was begun using section 7.2, "Main Turbine Stop Valve Test," of procedure 34SV-N30-001-2S.

The first TSV was tested successfully. At approximately 0510 CST, the Number 2 TSV was being tested. As the TSV was closing (the TSV testing consists of cycling the valve fully closed then fully open), both Recirculation Pumps

tripped on an End-of-Cycle Recirc Pump Trip (EOC-RPT) signal, i.e., TSV less than 90% open. Approximately nine seconds

after both Recirculation Pumps tripped the unit was scrammed manually at the direction of the Unit 2 Shift Supervisor. The unit was scrammed to comply with the requirements of Unit 2 Technical Specification Section 3.4.1.1, Action a. The action statement requires the mode switch to be placed in the shutdown position when there is no forced recirculation flow. (The mode switch was placed in the shutdown position approximately 40 seconds after the unit was scrammed manually and approximately 49 seconds after both Reci
culation Pumps had tripped.)

The scram recovery proceeded smoothly with no incident. Following the scram, reactor water level was controlled initially with the "A" Reactor Feedwater Pump (RFP EIIS Code SJ). At approximately 0535 CST (approximately 23 minutes following the scram), the Main Steam Line Isolation Valves (MSIVs EIIS Code JM) were closed to limit the cooldown rate. At this point, the Reactor Core Isolation Cooling (RCIC EIIS Code BN) system was initiated manually and along with a Control Rod Drive (CRD EIIS Code AA) system pump, was used to control reactor water level. Reactor water level varied between 52 inches above instrument zero and 18 inches below instrument zero (between 216 inches and 146 inches above the top of the active fuel).

Reactor pressure reached a maximum of 1000 psig during this event. Pressure was controlled initially using the Turbine Bypass Valves (EIIS Code JI) until approximately 0535 CST when the MSIVs were closed to limit cooldown rate. At approximately 0623 CST, Low Low Set (LLS EIIS Code JE) was armed and used to control pressure. Torus water level rose to a maximum of 149.7 inches due to RCIC and LLS Safety Relief Valve (SRV) operation. Level was lowered manually by the operator and reached a minimum level of 147.9 inches. The maximum Torus water temperature during the event was 97 deg. F. The Residual Heat Removal (RHR EIIS Code BO) system was used in the Torus Cooling Mode to lower the Torus water temperature to less than 95 deg. F.

Cause of Event

The immediate cause of this event was the closing of TSV Number 2 while the RPT logic sensed TSV Number 4 less than 90% open. (TSV Number 4 was open fully and had not yet been cycled when this event occurred.) When TSV Number 2 closed, relays 2C71-K10E and 2C71-K10D de-energized as expected. Relays 2C71-K10G and 2C71-K10H were already de-energized because the RPT logic sensed TSV Number 4 less than 90% open. With relays 2C71-K10G and 2C71-K10D de-energized simultaneously and with reactor power greater than 30%, the

Recirculation Pump Trip (RPT) circuit was completed and both Recirculation Pumps tripped per design.

The root cause of this event is component failure. Specifically, the roll pin in the actuating arm of limit switch 2N32-N400B (the limit switch for TSV Number 4) was broken. This prevented the limit switch from closing contacts and energizing relays 2C71-K10G and 2C71-K10H when TSV Number 4 was open fully. It appears the limit switch broke on 12/19/88 during Unit 2 startup activities (i.e., during resetting of the Unit 2 Turbine). The Process Computer Alarm Typer printouts for 12/19/88 and 12/20/88 show the RPT trip logic was reset successfully on 12/19/88. It could be reset only if the limit switch was working properly. On 12/20/88, the RPT logic was reset again, but only part of the logic reset. The part of the logic consistent with a failure of the TSV Number 4's limit switch did not reset. However, due to the RPT logic arrangement, no Main Control Room annunciation indicated this condition. The alarm typer printouts are used for recording alarms received, not for annunciating off-normal conditions.

Reportability Analysis and Safety Assessment

This report is required per 10 CFR 50.73(a)(2)(i) because the plant was required to be shutdown to meet the requirements of the Technical Specifications, specifically Unit 2 Technical Specification Section 3.4.1.1, Action a. This report also is required per 10 CFR 50.73 (a)(2)(iv) because an unplanned actuation of the Reactor Protection System (RPS EIIS Code JC) and Engineered Safety Features (ESF) occurred. Specifically, the RPS was initiated manually when both Recirculation Pumps tripped in order to comply with the Technical Specifications, and the Primary Containment Isolation System valve Group 2 actuated automatically on low (12 inches above instrument zero) reactor vessel water level.

TSV closure inputs to the RPS come from valve stem position switches mounted on the four TSVs. To provide the earliest positive indication of closure, each of the switches opens before the valve is more than 10% closed. The logic is arranged so that isolation of three or four steam lines initiates a scram. (Because the logic sensed the isolation of only two steam lines, no automatic scram was initiated.)

Turbine Stop Valve closure can also initiate an RPT whenever the first-stage turbine pressure is above that which corresponds to 30% of rated thermal power. The logic is arranged such that the closure of two TSVs may cause actuation while closure of three or more TSVs will always cause actuation. The RPT function is to trip the Recirculation Pumps in response to a turbine generator trip or load rejection. Scram/Recirculation Pump Trip initiation by

Turbine Stop Valve closure initiates a scram and RPT to prevent the core from exceeding the thermal

hydraulic safety limit during abnormal operational transients. The RPT system reduces the severity of the turbine generator trip and load rejection events by tripping the Recirculation Pumps early in the event. The rapid core flow reduction increases void content and thereby reduces reactivity in conjunction with the control rod scram.

In this event, the TSVs were being closed and reopened one at a time under procedurally controlled conditions in order to test them as required by Technical Specification surveillance requirements. When the second TSV (TSV Number 2) was closed to less than 90% open, the RPT system tripped both Recirculation Pumps because the logic sensed two TSVs less than 90% open. The RPT system functioned per design to limit the severity of what it thought to be a turbine trip. In fact there was no turbine trip. The reactor was not experiencing any pressure or water level transient associated with the TSV testing performed, therefore, the Recirculation Pump Trip was not needed to protect the core.

Following the Recirculation Pump Trip, the reactor was manually scrammed immediately (within approximately nine seconds following the pump trip) to comply with Technical Specification requirements. Due to void collapse, reactor water level initially decreased as expected. Water level decreased below the low reactor water level scram and PCIS Group 2 isolation setpoint (12 inches above instrument zero) approximately ten seconds following the manual scram (lowest level was approximately 18 inches below instrument zero). Group 2 isolation valves isolated and the RPS actuated (no control rods inserted as they had all inserted from the manual scram) as designed. Water level returned to above the setpoint approximately 27 seconds later. Water level was recovered with RFP flow and maintained above the scram and isolation setpoint with the RFPs until the MSIVs were closed. At that time, the RCIC system was used in conjunction with a CRD system pump to maintain reactor vessel water level. At no time was there a leak of any kind in the nuclear system process barrier. Had water level decreased due to a leak instead of void collapse, the PCIS would have isolated that leak.

The MSIVs were closed approximately 25 minutes into the event to limit the reactor vessel cooldown rate. At this point, steam was isolated to the RFPs, and the Turbine Steam Bypass Valves were unavailable for pressure control. The RCIC system and LLS were then used to control vessel water level and pressure, respectively, as designed. It should be noted the RCIC system was initiated manually as the operators did not allow water level to decrease to the automatic initiation setpoint.

Based on the above information, it is concluded this event had no adverse impact on nuclear safety. The above analysis is applicable to all power levels because the referenced systems are designed to perform their respective function at power levels up to 105% of rated thermal power.

Corrective Actions

The broken limit switch was repaired and satisfactorily functionally tested. The TSV surveillance was completed successfully prior to the reactor exceeding 30% of rated thermal power.

The Unit 1 and Unit 2 TSV and TCV surveillance procedures were revised temporarily to require that the RPT logic relays be verified to be energized prior to and after the stroking of each TSV or TCV. The temporary revisions will remain in place until permanent revisions are made effective.

Additional Information

1. Failed Component(s) Identification

MPL: 2N32-N400B
Manufacturer: National ACME Company Root Cause Code: X
Model Number: National ACME Type SL-4 Component Code: 33
Type: Turbine Stop Valve Number 4 Limit Switch
Manufacturer Code: N015
EIIS Code: JJ
Reportable to NPRDS: No

2. Previous Similar Events

No previous similar events were identified.

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January 18, 1989

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PLANT HATCH - UNIT 2
NRC DOCKET 50-366
OPERATING LICENSE NPF-5
LICENSEE EVENT REPORT
COMPONENT FAILURE CAUSES BOTH RECIRCULATION
PUMPS TO TRIP REQUIRING SCRAM

Gentlemen:

In accordance with the requirements of 10 CFR 50.73(a)(2)(i) and (iv), Georgia Power Company is submitting the enclosed Licensee Event Report (LER) concerning a manual scram initiated following tripping of both recirculation pumps. The event occurred at Plant Hatch - Unit 2.

Sincerely,

W. G. Hairston, III

SJB/sb

Enclosure: LER 50-366/1988-024

c: (see next page)

c: Georgia Power Company
Mr. A. C. Nix, General Manager - Plant Hatch
Mr. L. T. Gucwa, Manager, Nuclear Engineering and Licensing
GO-NORMS

U. S. Nuclear Regulatory Commission, Washington, D. C.
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U. S. Nuclear Regulatory Commission, Region II
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